



# BD FACSCalibur Flow Cytometer

The Automated, Multicolor Flow Cytometry System

A Complete System for  
Today's Laboratory

## **BD Biosciences**

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Immunocytometry Systems  
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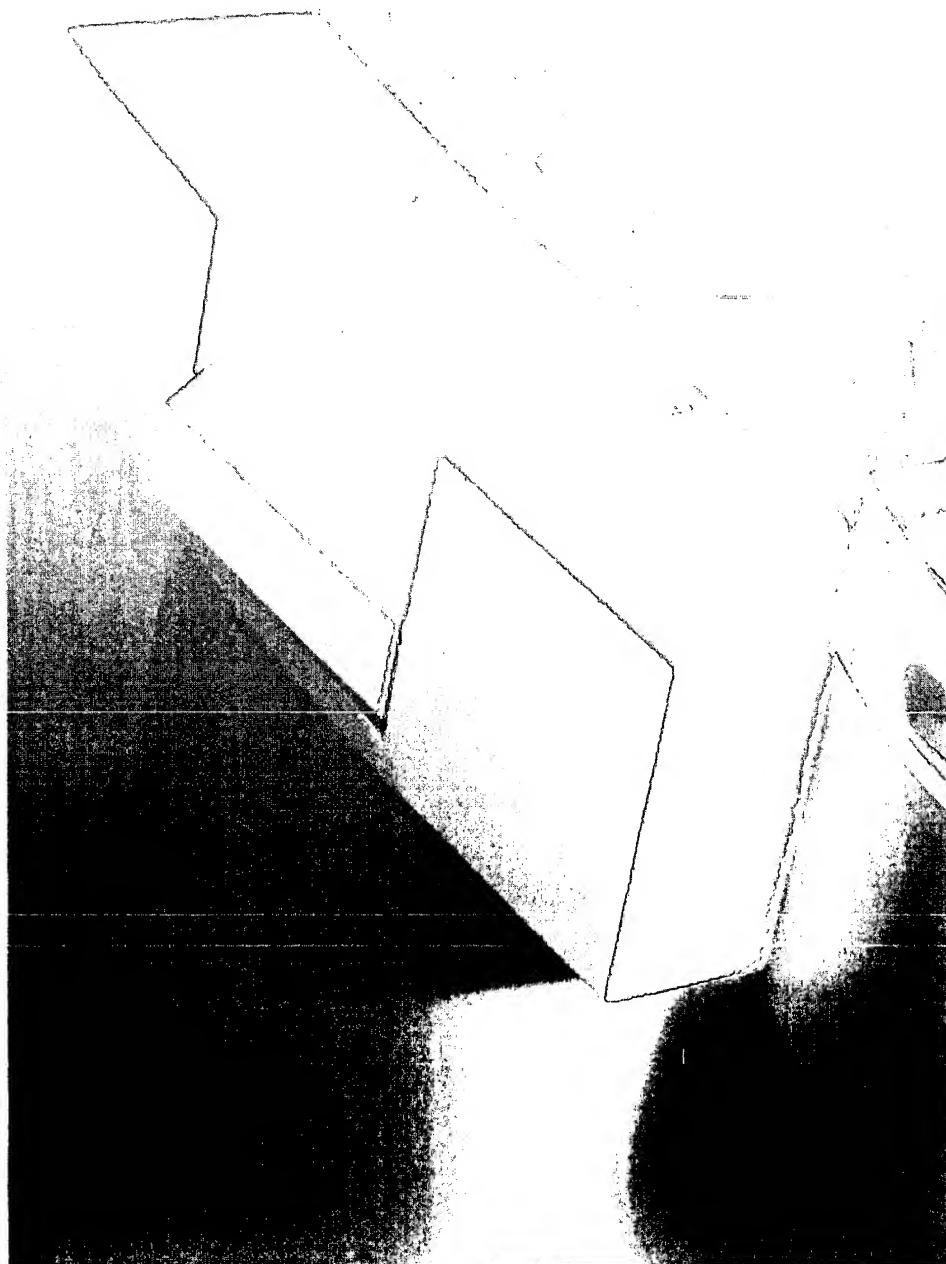
## The Gold Standard that Continues to Evolve

Since 1974, when the first  
Fluorescent Activated Cell  
Sorter was introduced,  
BD Biosciences has been  
the leading provider  
of innovative technology  
and advanced solutions in  
flow cytometry systems.  
Recognized as the gold  
standard in automated  
benchtop sorting and dual  
laser technology, the  
BD FACSCalibur™ system  
continues to be the  
instrument of choice for  
research and clinical  
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Your investment in a  
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pays off over and over again  
because they provide  
modular, flexible solutions  
that can be adjusted and  
evolved as your needs  
change. You have the option  
to choose a basic system  
or complete automated  
solutions, or to upgrade and  
choose an extension. Most  
important, you'll always get  
the industry's most reliable  
software and the service and  
support that come only from  
the best.

## The BD FACSCalibur System:

### The Gold Standard That Continues to Evolve

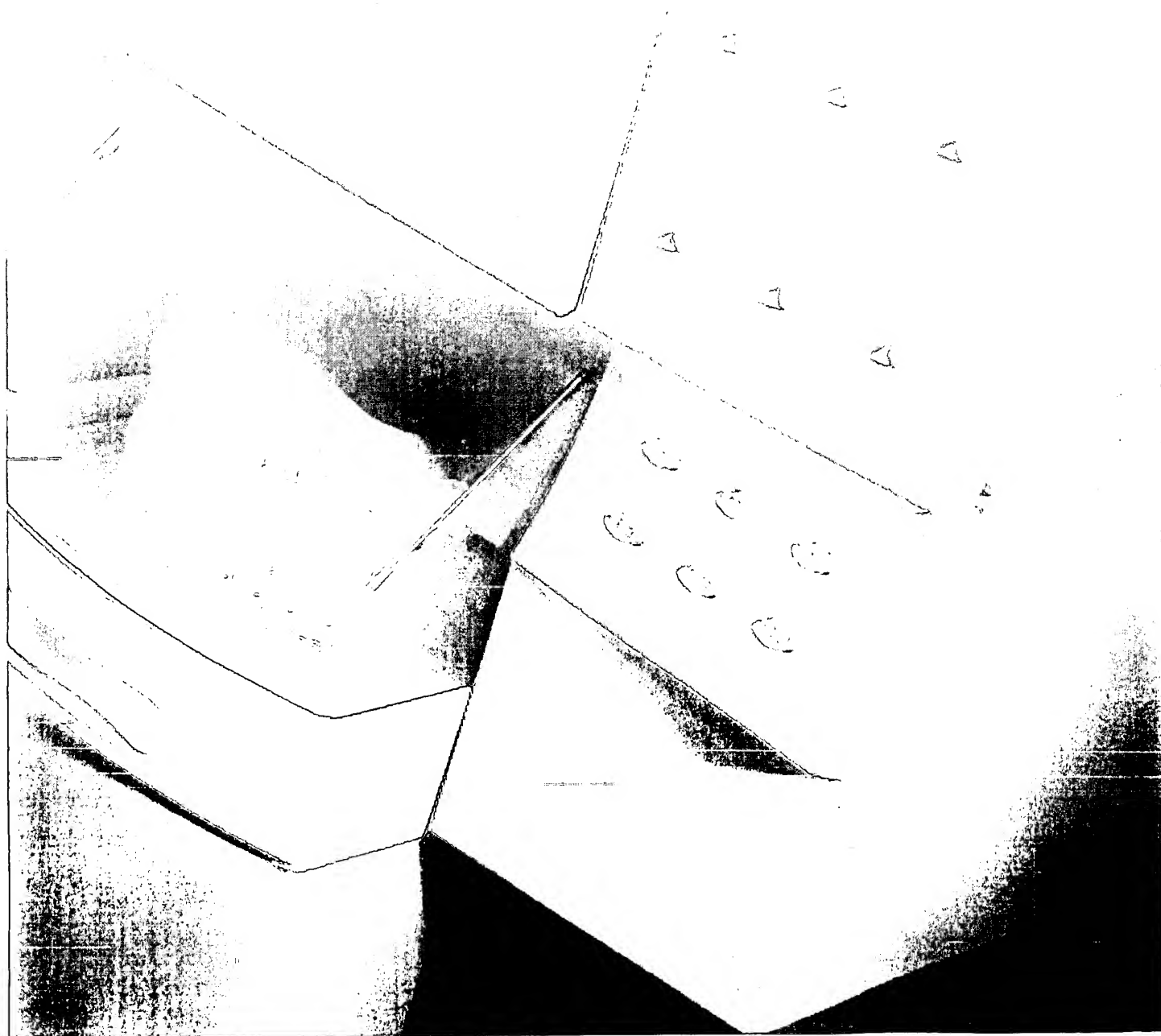
The BD FACSCalibur™ flow cytometer is another BD Biosciences first: a multicolor benchtop flow cytometry system that is capable of both analyzing and sorting. Combined with your choice of sample loader, a wide variety of reagents, and powerful software, the BD FACSCalibur system offers the high throughput necessary to meet productivity requirements without compromising the flexibility and performance essential for today's busy, cost-conscious laboratory.



Compact and easy to use, the BD FACSCalibur system can quickly perform routine tasks including immunophenotyping, absolute counting, residual white blood cell enumeration, stem cell analysis, DNA analysis, and isolation by sorting. And with its superior multicolor analysis and sorting capabilities, the BD FACSCalibur system is a highly sensitive tool, providing laboratories with the technological capabilities crucial for sophisticated cellular and molecular work in areas such as genetics, proteomics, multicolor analysis, and immune function.

The BD FACSCalibur system.

The modular instrument of choice for research and clinical laboratories worldwide. The gold standard that continues to evolve.





#### **BD FACSCalibur Flow Cytometer:**

**A Complete System For Today's Laboratory**

#### **BD FACSCalibur Cytometer\*:**

**A Modular Benchtop System**

The BD FACSCalibur flow cytometer is the first automated multicolor flow cytometry system that performs both analysis and sorting in one benchtop system. Designed specifically to support a wide range of applications, the BD FACSCalibur flow cytometer is a fully integrated multiparameter system that ensures objective, reproducible results so vital in today's clinical and research laboratories.

The BD FACSCalibur systems' user-centered design approach goes beyond mere ergonomics. Software instrument control, auto-sample loading, and pushbutton fluidic control maximize ease-of-use and productivity. Simple yet powerful software allows you to customize applications while automating redundant tasks. Finally, the BD FACSCalibur system lets you leverage your investment through a modular design that is flexible and upgradeable to meet your future needs.

#### **BD FACS Loader\*:**

**Routine Automation Enhances Productivity**

With the BD FACS™ Loader option, the BD FACSCalibur system provides walkaway automation for routine applications. Featuring removable 40-tube carousels, on-board mixing, and BD™ WorklistManager\* software, the BD FACS Loader option offers unsurpassed flexibility to efficiently address the workflow demands of today's laboratories.

#### **BD Multiwell AutoSampler†:**

**Flexible Easy-to-Use Automation**

For those who prefer to work with multiwell plates, BD Biosciences offers the first walkaway sample introduction device for 96- and 384-well plates, both standard and deep-well. BD Multiwell™ Plate Manager software provides an easy-to-use interface for you to input sample information and create customized protocols, making experiment runs as simple as click-and-go.

#### **Dual Lasers:**

**Optimized for Multicolor Analysis**

The BD FACSCalibur system offers the industry standard in multicolor analysis capability—two lasers spatially separated for high sensitivity, minimal compensation, and maximum flexibility in fluorochrome selection. With multicolor analysis, you maximize the information gained from small samples, as well as increase the cost-effectiveness of each assay.

#### **Cell Sorting†:**

**Innovative Technology Makes Cell Sorting Routine**

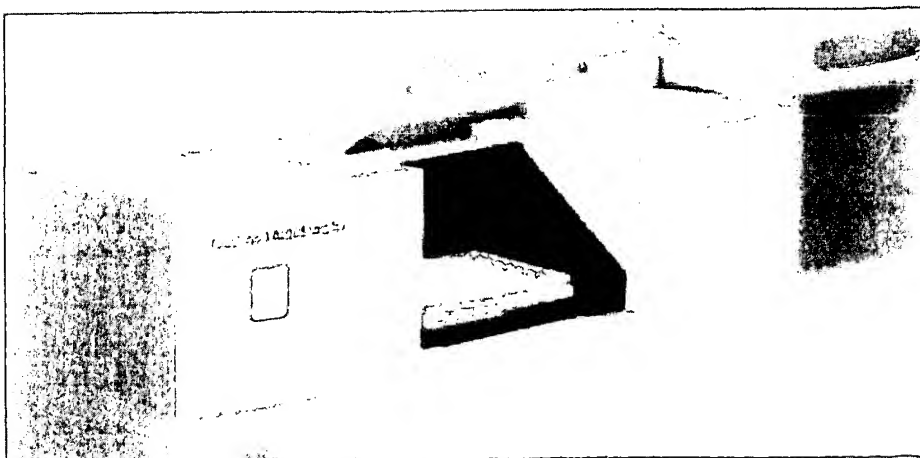
The BD FACSCalibur system is the first benchtop flow cytometry system available that is capable of sorting cells of interest for further study. With the BD FACSCalibur system, sorting is routine—just gate the population of interest and click ACQUIRE—the BD FACSCalibur system does the rest. Sorting occurs in a completely enclosed, aerosol-free environment for enhanced safety when processing biohazardous samples. Cells sorted by the BD FACSCalibur system are collected into test tubes, or if desired, can be deposited directly onto filters or cell culture inserts with the Cell Concentrator Module option.

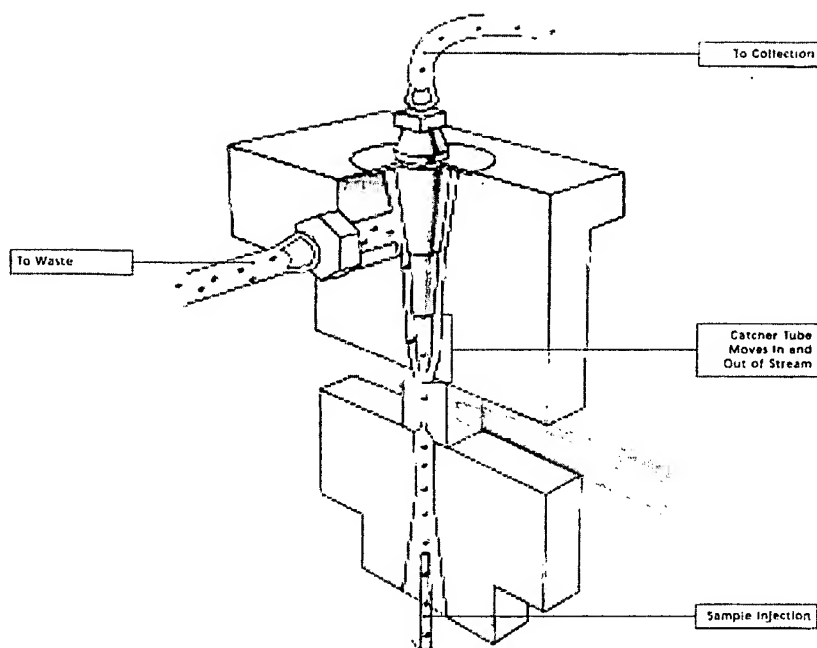
#### **BD FACStation**

**Data Management System:**

**Powerful and Easy-to-Use**

The ease-of-use of the BD FACSCalibur system is enhanced by its user-friendly data management system. The BD FACStation™ workstation takes advantage of the intuitive Macintosh® environment by using simple pull-down menus and icons. It performs all the computing tasks required for fast, accurate results, including instrument setup as well as data collection, analysis, and management. The BD FACStation workstation offers automated software and high-performance acquisition and analysis tools for plotting, gating, statistical analysis, and reporting.





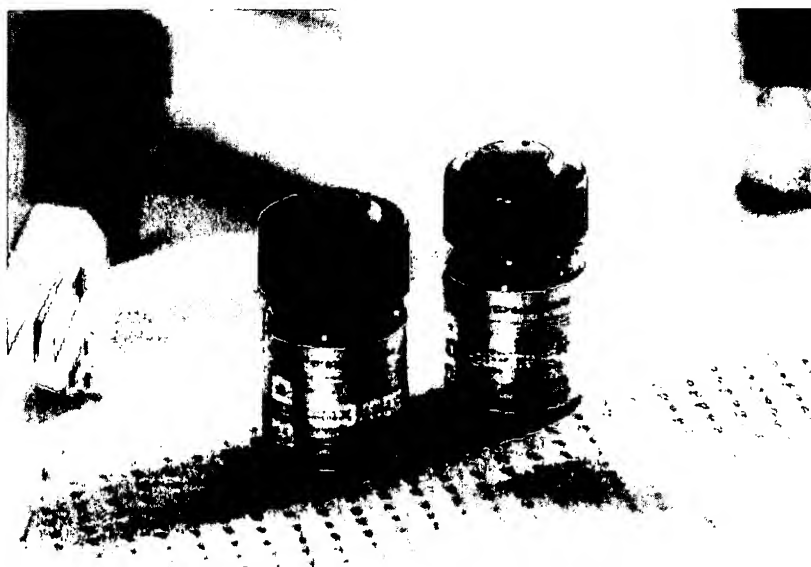
**Figure 1**

#### **Unique Sorting Technology**

The BD FACSCalibur system features a unique catcher tube mechanism that moves in and out of the sample core stream 300 times per second to capture designated cells after they pass through the laser. The cells are then directed to collection tubes or the Cell Concentrator Module (optional) for further processing.

#### **Reagents**

BD Biosciences offers a broad range of reagent products designed to meet multiple application requirements—from reagent and software systems for routine clinical analyses to cutting-edge research reagents and custom conjugates to enhance your research capabilities. BD Biosciences also offers a complete line of quality assurance products and services for instrument validation, method control, reliable gating, absolute counting, and within-panel consistency checks.



#### **Routine Applications:**

##### **Productivity and Simplicity When it Counts**

Laboratory technologists will appreciate the BD FACSCalibur system for its user-friendly design, high sample throughput, improved workflow management through automation, and simple yet sophisticated software applications that enhance routine analyses.

Whether you are performing immunophenotyping of lymphocyte subsets, leukemia or lymphoma studies, transplantation research, residual white blood cell enumeration, or a wide range of other applications, the BD FACSCalibur system provides the tools you need to obtain results quickly, easily, and accurately.

##### **Immunophenotyping**

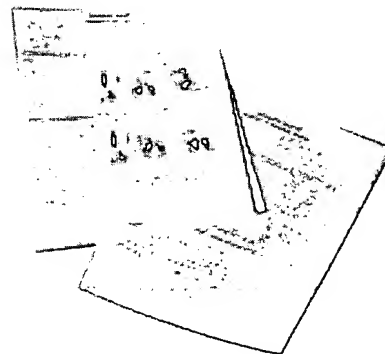
Characterizing cells at different stages of development through the use of fluorescent-labeled monoclonal antibodies against surface markers is one of the most common applications of flow cytometry. The BD FACSCalibur system opens the window to this world of information by providing multicolor capability in an easy-to-use system. Instrument setup is as easy as a push of a button and a click of the mouse. Efficient collection optics, coupled to the flow cell with an optical gel, permit the use of a low-powered, air-cooled argon laser and a red diode laser to ensure the high sensitivity required for analysis of low-density antigens.

BD Biosciences also provides software and reagent systems to maximize your laboratory's productivity. BD MultiSET™ software, in combination with BD MultiTEST™ reagents and BD Multi-Check controls, provides a complete system for automating data acquisition and analysis.

Our timesaving lyse/no-wash methodology† using BD MultiTEST reagents reduces sample handling and provides more answers per tube, leaving you with more time to perform other valuable tests. By using BD Biosciences exclusive Expert Gate, BD MultiSET software ensures that the cell population of interest is analyzed, increasing the accuracy and reliability of your results.

##### **Absolute Counts**

BD TruCOUNT™ Tubes make single-platform absolute counting easy—no syringes, additional pipetting steps, or need to integrate data from another analyzer. Designed for use with clinical products such as BD MultiTEST and BD TriTEST™ lymphocyte subset reagents, BD LeucoCOUNT™ rWBC enumeration kit, and BD ProCOUNT™ progenitor cell enumeration kit, BD TruCOUNT Tubes bring precision to your counts and improved productivity to your lab. For research applications, BD Liquid Counting beads† are also available for quick estimations of cell culture or bacterial concentration.



**Figure 2**

##### **Clinical Lab Reports**

The BD MultiSET software Lab Report contains lymphocyte subset information, including optional absolute counts, reference-range checks, T-helper/suppressor ratio, and tube-to-tube consistency checks.

### Residual White Blood Cell Enumeration

The BD LeucoCOUNT system is the first automated, IVD-cleared product for monitoring leucoreduced blood products. Together with BD TruCOUNT Tubes and BD LeucoCOUNT process controls, the BD LeucoCOUNT system provides excellent accuracy, precision, and linearity. For high throughput walkaway capability, the BD FACS Loader can also be added to your system.

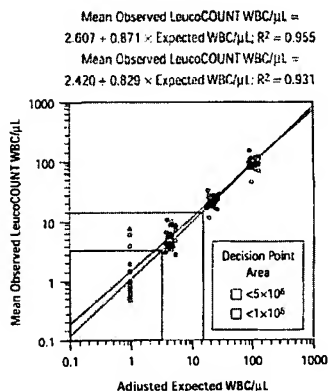
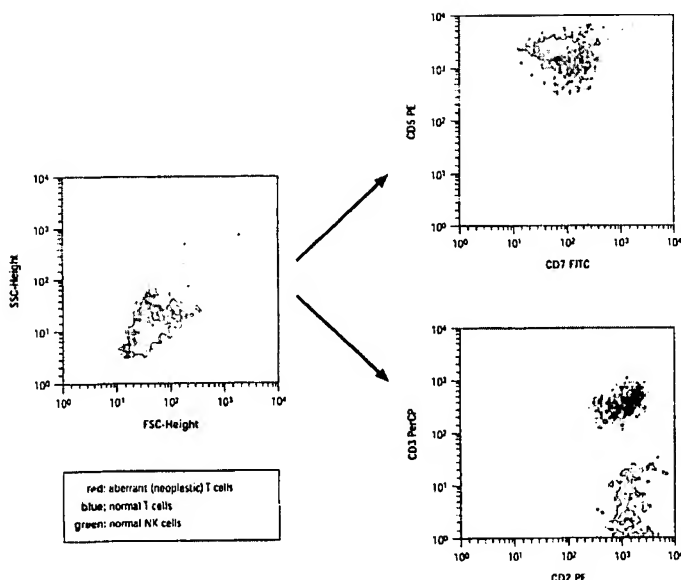


Figure 3

#### BD LeucoCOUNT Kit

The BD LeucoCOUNT system provides excellent accuracy, precision, and linearity at clinically significant levels of detection for RBC (red) and platelet (blue) samples.



### DNA Analysis†

The DNA Analysis System components work together, from sample preparation to analysis, to eliminate many of the variables associated with ploidy and cell-cycle analysis. The BD FACSCalibur system's optical and fluidic design ensures that high-resolution DNA ploidy and S-phase determinations are easily achievable. Electronic doublet discrimination, utilizing the area and width of the fluorescence pulse, allows for the removal of artifacts—doublets and aggregates—from the analysis. High-resolution electronics and linearity ensure accurate results, and DNA QC particles verify optimal performance.

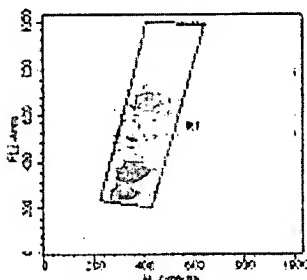


Figure 4

#### DNA Analysis

Pulse processing is a powerful tool used in the discrimination of doublets for optimal DNA analysis.

### Quality Assurance

BD Biosciences offers a complete family of products designed to ensure the highest quality clinical results from the BD FACSCalibur system.

BD FACSComp™ software, in conjunction with BD CaliBRITE™ beads, provides a comprehensive system to set up the instrument, assess sensitivity, and set compensation for immunofluorescence applications. For clinical applications, BD Biosciences offers a wide variety of cellular controls to verify performance for immunophenotyping, reticulocyte analysis, stem cell enumeration, and rWBC applications.

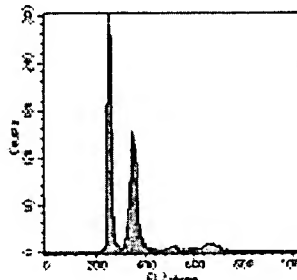


Figure 5

#### Peripheral T-cell Lymphoma

Two four-color tubes are shown: 1) CD7 FITC vs CD5 PE and CD45RO APC vs CD3 PerCP, and 2) CD2 PE vs CD3 PerCP and CD8 FITC vs CD4 APC. Aberrant T cells are colored red, normal T cells are colored blue, and normal NK cells are colored green.

## Advanced Applications

### Performance and Flexibility When it Counts

Researchers and pathologists will appreciate the BD FACSCalibur system for its flexibility, which allows them to expand their menu of applications as their needs change. From genes to proteins to cells, this high-performance system is a valuable tool for assay development, verification, and physical separation of cells of interest for further testing or analysis.

## Multicolor Analysis

Flow cytometry has rapidly evolved toward the use of multiple fluorochromes as an effective means of identifying subset populations within a single sample—maximizing the information gained from small samples, as well as increasing the cost-effectiveness of each assay. BD Biosciences pioneered the technology used in multicolor analysis and sets the industry standard with its use of two spatially separated laser beams. This dual-laser technology ensures high sensitivity, minimal compensation, and maximum flexibility in fluorochrome selection. And the BD FACSCalibur system is the first to include diode laser technology and interbeam compensation—all in an alignment-free benchtop system.

## Sorting†

Multiparameter flow cytometry combined with cell sorting adds an additional dimension to the information you gain from your sample. Purification of subpopulations through sorting is useful, eliminating contaminants that can interfere with sensitive assays, increasing the number of target cells in the sample, or confirming flow cytometric findings. Cell sorting is ideal for verifying cell morphology and performing subsequent molecular techniques such as FISH or PCR, or functional assays. Cross-correlation of the flow cytometric information with results of the post-sort assay is a powerful tool in cellular analysis.

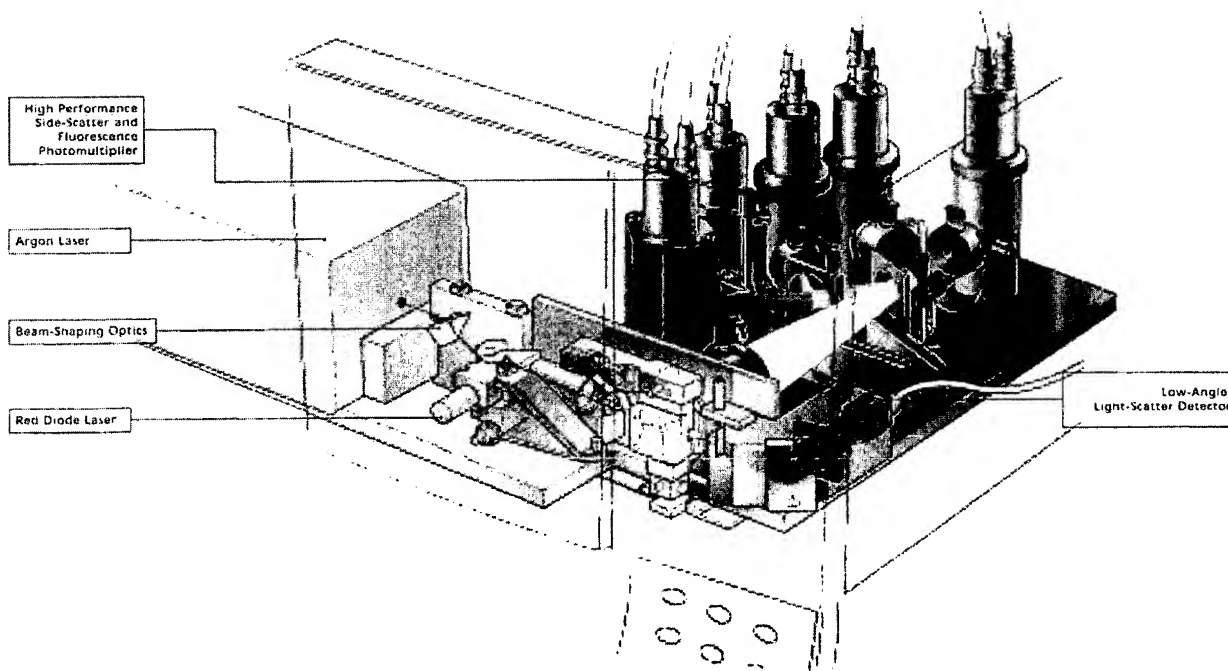






Figure 6A



Figure 6B

#### Figures 6A&B

##### Sorting Results

PBMC and Daudi fractions were sorted for purity based on immunofluorescence and scatter. Female PBMC and male Daudi were mixed and hybridized with chromosome Y (green) probes and counterstained with DAPI (red). The hybridization of the sorted fractions show pure female PMBC (Figure 6A, two red dots) and male Daudi cells (Figure 6B, a red and a green dot), as expected.

(Courtesy of Nga Bui, Tom Frey, PhD, Sharyl Iwata, and Kathy Yokobata, BD Biosciences.)

#### Additional Applications<sup>†</sup>

A thorough understanding of the biology of the system under study, combined with the power and flexibility of the BD FACSCalibur system, reagents, and data analysis tools, ensures the successful application of flow cytometry in broad areas of biological and medical research. Fluorescence quantitation with BD QuantiBRITE™ reagents, platelet analysis, stem cell research, multiparameter DNA analysis, BD Cytometric Bead Array, fluorescent protein research, and microbial analysis are just a few of the forward-focused application possibilities using the BD FACSCalibur system.

#### Lymphocyte Function Assessment<sup>†</sup>

The BD FastImmune™ assay system is an innovative flow cytometric activation assay using whole blood to directly assess individual T-lymphocyte subset responses to a wide variety of physiological and nonphysiological stimuli. And unlike radioisotope methods that are time and labor intensive, the BD FastImmune assay is completed in just hours. The system's unique approach makes it the ideal research tool for answering basic biological questions regarding immune regulation, T-cell subset responses to viral and bacterial antigens, and immune status assessment for chemotherapy, transplantation, and parasitology.

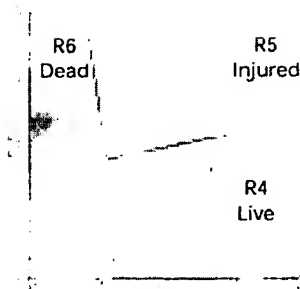


Figure 7

##### Bacterial Applications

Viability and concentration of bacteria from pharmaceutical, food, or environmental samples can be demonstrated using propidium iodide (PI), thiazole orange (TO), and BD Liquid counting beads.<sup>†</sup> This sample of *P. aeruginosa* was prepared in staining buffer at  $5 \times 10^5$  cells/ $\mu$ L.

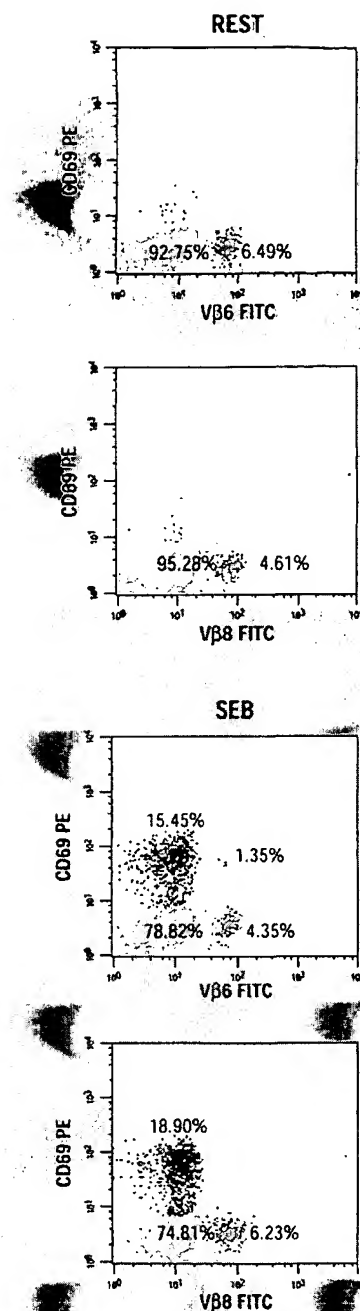


Figure 8

##### Superantigen Activation of T Cells

The BD FastImmune Assay system<sup>†</sup> can be employed to examine specific antigen responses in human whole blood. Staphylococcal enterotoxin B (SEB) activates VB6 T-cell subsets, but does not activate VB8 subsets, as determined by CD69 expression.<sup>†</sup>

BD's new, advanced  
 Analytical Instrument  
 System, the BD FACSCalibur™,  
 provides the most powerful

performance and flexibility in  
 flow cytometry. The BD FACSCalibur™  
 is the most powerful

flow cytometer available today.  
 The BD FACSCalibur™ is the most powerful  
 flow cytometer available today.

Scatter plot analysis is the  
 most powerful tool for analyzing  
 flow cytometry data.

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US 120 VAC +/- 10%  
 4000 Hz +/- 2 Hz  
 Current 1.5 amps maximum  
 Output 120 VAC +/- 10%, 4000 Hz  
 or 220-240 VAC +/- 10%,  
 4000 Hz +/- 2 Hz

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## The BD FACSCalibur System

### Service and Support When it Counts

Because we understand how critical it is to have your system up and running, BD Biosciences backs its instruments, software, and reagents with BD FACService™, the most highly rated service and support program in the industry. BD FACService ensures maximum instrument up-time and optimal performance with guaranteed response times, preventative maintenance programs, and highly trained service and application specialists.

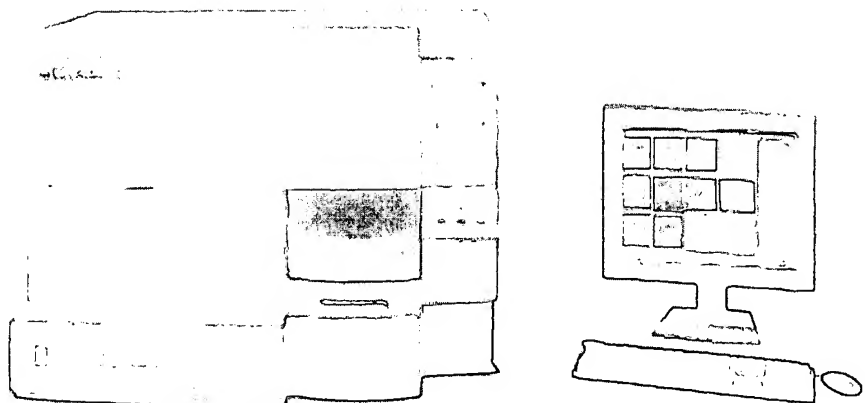
In addition, we provide a variety of training packages and customized educational programs for your laboratory personnel that can be tailored to meet the requirements of users at any skill level. This ensures a shorter learning curve and increased productivity for your laboratory.

### The BD FACSCalibur System:

#### The Gold Standard That Continues to Evolve

With its innovative reagents, powerful application software, and advanced cytometry hardware, the BD FACSCalibur system is the answer to your laboratory needs. Its built-in versatility meets the current demands of both clinical and research environments; its modularity takes you into the future. Best of all, the BD FACSCalibur system is backed by the leader in flow cytometry, BD Biosciences.

To find out more about how the BD FACSCalibur system can contribute to your lab's productivity and performance, contact your local BD Biosciences sales representative.



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\* For In Vitro Diagnostic use

† For Research Use Only Not for use in diagnostic or therapeutic procedures.

‡ Lysate/Wash Method: US Patent No. 5,776,709; FastImmune activation measurement: US Patent Nos. 5,445,939; 5,656,446; 5,834,583, 649,689; European Patent No. 319,543; Canadian Patent No. 1,296,622; Australian Patent No. 815,880; and Japanese Patent No. 2,769,156; Triazole Orange: US Patent Nos. 4,883,867 and 4,897,870

§ Data obtained from three representative instruments using Spherotech Rainbow RCP 3D-SA particles.

The BD FACSCalibur instrument is a Class I laser product per IEC 825-1 and 21 CFR 1040

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